

REMARKS

In the Office Action claims 1-6 were rejected as being indefinite, the Examiner indicating that the term "high overlap" needed to be defined to have patentable weight.

In response, claim 6 on page 2 of the specification has been amended to include the definition of the phrase "high fixed intake and exhaust valve overlap" as used in claim 1. The definition relates the amount of overlap to that of a vehicle engine with all cylinders firing since it is apparent that valve overlap requirements for particular engine vehicle arrangements will vary in order to obtain acceptable idle smoothness and stability as referred to in the background of the invention.

Accordingly, the range of intake/exhaust valve opening overlap areas covered by the invention would vary depending on the particular engine involved but would fall in a range of high overlap or greater overlap than would occur in a conventional engine operating on all cylinders. Withdrawal of the Section 112 rejection is requested.

Claims 1-5 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. 6,332,445 Voss et al. and claim 6 was rejected as unpatentable over Voss et al. Reconsideration is requested.

A careful review of the explanations supporting the rejections as well as the Voss et al. disclosure indicates that there may be some confusion of the terms valve timing, valve lift, and valve overlap. In general, valve timing relates to the time, usually expressed in crankshaft degrees, of beginning opening of a valve and the end of closing of the valve with variation of valve timing occurring by advancing or retarding the opening and/or closing points of the valve lift. Valve lift pertains to the degree to which the valve is opened, which may be varied by mechanisms or in other ways to change from full lift to partial lift to no lift. Valve overlap pertains to the relationship between timing of the intake and exhaust valves of a cylinder. In particular, the overlap is that

period during which the intake valve begins to open before the exhaust valve has finished closing. This valve overlap can be varied in some engines to increase or decrease the amount of interchange of gases between the intake and exhaust systems during engine operation. Increasing the intake/exhaust valve overlap increases the time in which the exhaust gases can be mixed with the intake gases in the cylinder before the exhaust valve closes and thereby assist in diluting the charge, which has a beneficial effect in reducing oxides of nitrogen (NOx) exhaust emissions.

It is submitted that the Voss et al. disclosure has no connection with varying either valve timing or valve overlap but instead pertains solely to varying valve lift between full open, partially open and closed positions with the opposite banks of the engine having various combinations of valve lift. Also, the discussion of Voss et al. pertains solely to the intake valves, although it is clear that some comparable motion of the exhaust valves would likely be involved even though the form it would take is not discussed. In addition, it is not at all disclosed what type of camshafts are involved in controlling the valves of the Voss et al. engine so that it is not known whether the timing of the intake and exhaust valves can be varied separately and thus change the valve overlap or whether a single camshaft controls both intake and exhaust valves with a fixed valve overlap.

Accordingly, Voss et al. does not teach as to claim 1 "providing a high fixed intake and exhaust valve overlap" nor does it disclose "equally varying the intake and exhaust valve timing", both of which are required to anticipate claim 1.

Further, as to claim 3, Voss et al. does not disclose "at least one camshaft timed to operate the valves with a high performance fixed overlap", nor does it recite a cam phaser for each camshaft controlled to equally vary the intake and exhaust valve timing."

According it is submitted that the statements of the Office Action that the Voss et al. disclosure involves varying intake and exhaust valve timing are inaccurate, but rather Voss et al. involves varying only valve lift. Additionally, support for the

statement that the engine is able to be started with up to half the cylinders deactivated is not believed to be supported by the Voss et al. disclosure. Further, there is no cam phaser controlling intake and exhaust valve timing. Instead a hydraulic control operates to vary the valve lift of the valves of the separate cylinder banks. Thus, the control unit is not a cam phaser which varies valve timing but only a valve lift control which varies the amount of valve opening.

In view of the foregoing, it is submitted that Voss et al. does not anticipate claims 1-6, which call for a fixed intake/exhaust valve overlap larger than would provide acceptable idle quality in a conventional engine and selected to improve open throttle performance and reduce NOx emissions, together with equally varying intake and exhaust valve timing (as with a cam phaser) and deactivation of up to half the cylinders at idle and low speed/load operation. Accordingly, withdrawal of the rejections of claims 1-6 is requested.

This amendment is believed to be fully responsive to the issues raised in the Office Action and to place this case in condition for allowance. Favorable action is requested.

Respectfully submitted,

By 

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